MARKING RULES

U. S.
INDIAN SERVICE
Forestry Division
DEPT. OF THE INTERIOR
Klamath Agency, Oregon

UNITED STATES
DEPARTMENT OF THE INTERIOR
INDIAN FIELD SERVICE

OFFICIAL BUSINESS

The enclosed card may be used in the field as a guide to the marking instructions.

The card should not be used, however, unless the instructions are thoroughly understood.

Guide to Marking Rules - Klamath Indian Reservation

TYPE 1:- BEETLE HAZARD HIGH

ALWAYS LEAVE:- All of Class 1; All of Class 2; Class 3A (Unless beetle-infested and merchantable)

ALWAYS CUT :- Class 3C; Class 3D; Class 4B; Class 4C; Class 4D - Also cut all beetle-infested trees of any class if merchantable.

MARGINAL TREES	CUT	LEAVE
Class 3B	When over 30" and others over 18" if not thrifty.	When below 30" if thrifty.
Class 4A	Cut except as noted.	Leave occasional trees below 34" if needed in gaps.

SEE OVER FOR CUTTING INSTRUCTIONS IN TYPE 2:- BEETLE HAZARD LOW

Note for both types: In small groups generally either take all or leave all trees. Leave trees that will be culls. Don't consider basal fire scars unless covering over 1/2 the circumference.

Guide to Marking Rules - Klamath Indian Reservation

TYPE 2:- BEETLE HAZARD LOW:

ALWAYS LEAVE:- All of Class 1; All of Class 2; Class 3A.
(Unless beetle-infested and merchantable)

ALWAYS CUT :- Class 3D; Class 4B; Class 4C; Class 4D. Also cut all beetle-infested trees of any class, if merchantable.

MARGINAL TREES	CUT	LEAVE
Class 3B	When over 34" unless needed to fill gaps.	When under 34" or needed to fill gaps.
Class 3C	Cut except as noted.	Leave exceptionally good trees up to 22" if needed
Class 4A	When over 34" unless needed to fill gaps.	When under 34" or when needed to fill large gaps.

SEE OVER FOR CUTTING RULES IN TYPE 1:- BEETLE HAZARD HIGH

Guide to Marking Rules - Klamath Indian Agency

TYPE 1:- BEETLE HAZARD HIGH

ALWAYS LEAVE:- All of Class 1; All of Class 2; Class 3A. (Unless beetle-infested and merchantable)

ALWAYS CUT :- Class 3C; Class 3D; Class 4B; Class 4C; Class 4D. Also cut all beetle-infested trees of any class if merchantable.

MARGINAL TREES	CUT	LEAVE
Class 3B	When over 30" and others over 18" if not thrifty	When below 30" if thrifty.
Class 4A	Cut except as noted.	Leave occasional trees below 34" if needed in gaps

SEE OVER FOR CUTTING INSTRUCTIONS IN TYPE 2:- BEETLE HAZARD LOW.

Note for both types: In small groups generally either take all or leave all trees. Leave trees that will be culls. Don't consider basal fire scars unless covering over 1/2 the circumference.

Guide to Marking Rules - Klamath Indian Reservation

TYPE 2:- BEETLE HAZARD LOW:

ALWAYS LEAVE:- All of Class 1; All of Class 2; Class 3A. (Unless beetle-infested and merchantable)

ALWAYS CUT :- Class 3D; Class 4B; Class 4C; Class 4D. Also cut all beetle-infested trees of any class, if merchantable.

MARGINAL TREES	CUT	LEAVE
Class 3B	When over 34" unless needed to fill gaps.	When under 34" or needed to fill gaps.
Class 3C	Cut except as noted.	Leave exceptionally good trees up to 22" if needed
Class 4A	When over 34" unless needed to fill gaps.	When under 34" or when needed to fill large gaps.

SEE OVER FOR CUTTING RULES IN TYPE 1:- BEETLE HAZARD HIGH

Forestry
Klamath

Klamath Indian Agency
Klamath Agency
Oregon

339.7

October 30, 1937

Memorandum to the Forestry Personnel:

In conducting our timber sales we find that the marking of trees to be cut is a matter of primary importance, requiring continued study by all concerned. Marking rules should be in accordance with good forestry practice and should also meet the contract requirements under which a given area is being operated. Furthermore, they should be understood readily and applied easily in the field.

The attached marking rules were proposed by Mr. Carthon R. Patrie, Forester, of our Spokane office, in a report dated September 20, 1937. They were then tested in the field on this Reservation by Mr. Patrie, with Forest Assistant Weaver, and forestry personnel of this agency. Slight changes were made following the field test.

You will find that the main objective of these marking rules is to place the reserved stands in as healthy and beetle-resistant condition as possible. The per cent of volume removed is a secondary consideration except to the extent that a reasonable cut must be allowed the operator.

The marking rules are readily grasped after one has become familiar with Keen's Tree Classification, and they are easily applied in actual practice. Our field tests seem to indicate that if one follows these rules, to the letter, he will obtain acceptable results. The experienced timber marker may modify them slightly, however, to take care of very local conditions or individual cases. For instance, he might reserve a particular tree above the indicated D. B. H. limit; or, cut one below the limit, but he should bear in mind that such modifications of the rules require very good reasons.

You are accordingly instructed to follow these marking rules as they appear, beginning on page 7 of the report, in connection with timber sale activities on the Klamath Indian Reservation. We shall study the results periodically, and we ask you to cooperate through personal observations and suggestions.

B. G. Courtright
Superintendent

By: (Signed) George S. Kephart

George S. Kephart
Forest Supervisor

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PROPOSED MARKING REGULATIONS
FOR THE
KLAMATH INDIAN RESERVATION
OREGON

The Indian Service is committed to a broad policy of conservation in connection with its management of the Ponderosa pine forests of the Klamath Indian Reservation and in conformity thereto aims to so direct the development of these resources as to insure a balanced maximum income to the Klamath Indians which is consistent with sound silviculture; to secure the perpetuation of the Klamath forests in a safe and entire state; and to reduce the losses resultant from beetle infestation and other destructive agencies to a minimum.

Proceeding in accordance with this general policy, it is the purpose and intent of the Indian Service to direct the cutting of the forests of the Klamath Indian Reservation in a manner which will provide for the utilization of the mature and over-mature trees; to leave standing undamaged the immature trees and the reproduction as a nucleus of an early second crop; to preserve a uniform and continuous forest cover; to select and utilize beetle susceptible trees; and, finally, to create, insofar as is practicable, a beetle resistant stand which will insure a maximum degree of protection against the inroads now being made by that destructive agency in the virgin stands.

By far the most important problem in the management of the pine forests of the Klamath Indian Reservation is the hazard of continued heavy loss from Dendroctonus brevicomis; and the practice of selective logging, with a view to eliminating the beetle susceptible trees and at the same time securing a balanced distribution of age classes, offers the only practicable permanent solution thereof. Accordingly, the marking regulations which follow have been prescribed in the light of that major problem and in accordance with the tree classification formulated by Mr. F. P. Keen, Entomologist, in his treatise entitled "A Ponderosa Pine Tree Classification for use in Determining Susceptibility to Barkbeetle Attack".

THE KEEN TREE CLASSIFICATION

The Keen Ponderosa pine tree classification is an adaptation of the Dunning classification (Duncan Dunning - A Tree Classification for the Selective Forests of the Sierra Nevada - 1928), which has received such wide use in silvicultural studies and practice in western yellow pine forests, but is extended from the original seven to a total of sixteen separate tree classes. It was found in the field that Dunning's seven classes were too broad and tended to conceal differences in barkbeetle susceptibility within classes. This tendency has been very largely, if not entirely, eliminated in the Keen Classification, which, in addition, is somewhat simpler to remember and apply.

The Keen Classification is based upon the two major factors of age and vigor, and is particularly applicable to the Ponderosa pine forests of the Pacific region. The trees are first classed according to age into four groups, numbered 1 to 4, and according to degree of crown vigor into four groups lettered A, B, C, D. Combining the two factors of age and vigor gives 16 possible classes into which any Ponderosa pine tree in the stand can be divided. The following is a description of the different age and vigor groups as taken from Mr. Keen's treatise on the subject:

"Age Groups

"Trees are first divided into the four general age groups of young, immature, mature and overmature. In the average Site IV ponderosa pine stand of the Pacific region, the characteristics of each of these age groups are as follows:

1. Young trees - commonly referred to as "bull pines" or "Blackjacks"; usually less than 75 years of age, with dark-brown to black, deeply ridged bark; tops usually pointed and branches upturned and in whorls.

2. Immature trees - Age approximately 75 to 150 years; trees still making height growth and with pointed tops; reddish-brown, fissured bark; branches mostly upturned and in whorls.

3. Mature trees - approximately 150 to 300 years old; usually with rounded or pointed tops; bark light reddish brown with moderately large plates between the fissures; incomplete whorls of branches with nodes indistinct; nearly all branches horizontal and the lower ones drooping.

4. Overmature trees - usually over 300 years old; with flat tops and making no further height growth; branches mostly drooping, gnarled or crooked; bark light yellow in color, the plates usually very wide, long and smooth.

In dividing trees into these four general age classes it is more important to consider what might be called the 'Physiological age' of the tree than its actual age as indicated by annual rings. Some trees growing under favorable conditions, particularly on good sites, retain their youthful appearance much longer than do trees on poor sites which have been forced to struggle against unfavorable growth conditions. Since the four age groups are a matter of relative maturity, trees somewhat younger or older than the designated age limits but having all of the outward characteristics of a certain age group should be classified accordingly.

Vigor Groups

In judging the relative vigor of different trees of a given age, the size of crown and abundance of foliage is probably the best outward indicator. Therefore, each age class was further subdivided into four sub-groups based upon relative crown vigor. These were designated by letters A to D as follows:

A. Full vigorous crowns with a length of 55 per cent or more of the total height and of average width or wider; foliage usually dense; needles long and dark green; position of tree isolated or dominant (rarely codominant).

B. Fair to moderately vigorous crowns with average width or narrower, and length less than 55 per cent of the total height; either short wide crowns or long narrow ones, but not sparse nor ragged; position, usually codominant but sometimes isolated or dominant.

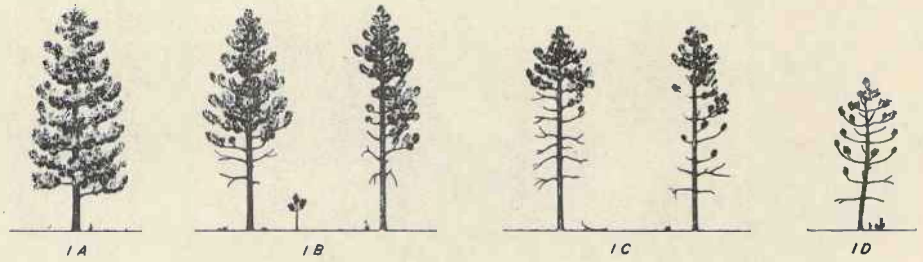
C. Fair to poor crowns, very narrow and sparse or represented by only a tuft of foliage at the top; foliage usually short and thin; position usually intermediate, sometimes codominant, rarely isolated.

D. Crowns of very poor vigor; foliage sparse and scattered or only partially developed; diameters decidedly subnormal considering age; position suppressed or intermediate."

Thus, by combining the four age groups with the four subgroups of crown vigor, a total of sixteen classes are obtained. The chart on the following page illustrates the different classes:

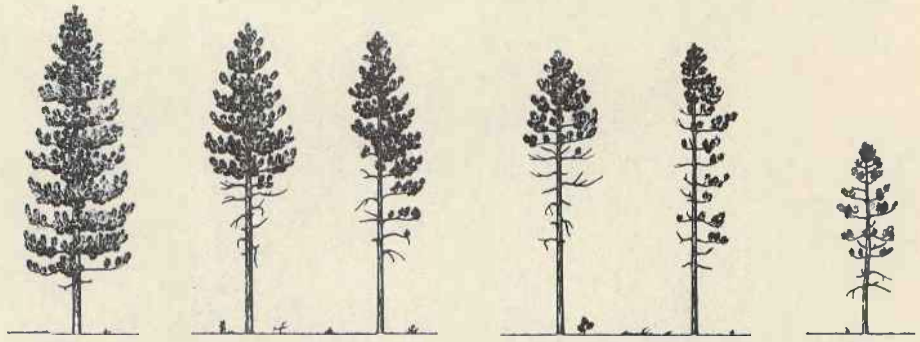
A PONDEROSA PINE TREE CLASSIFICATION

FOR COMPARISON OF BARKBEETLE SUSCEPTIBILITY
CLASSES BASED ON AGE AND VIGOR



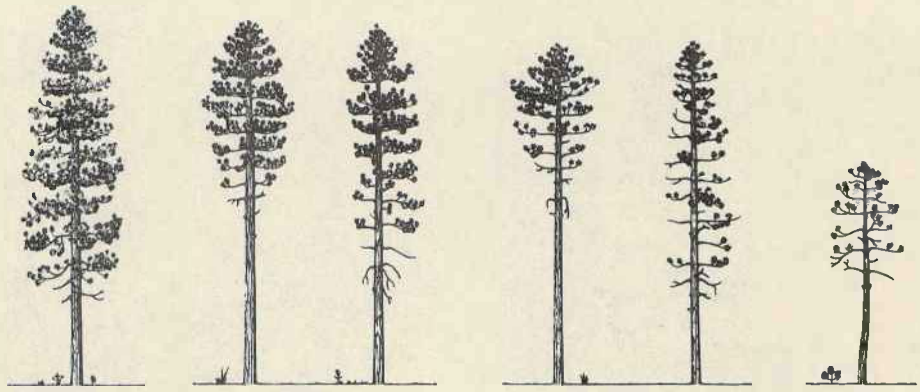
1A 1B 1C 1D

2



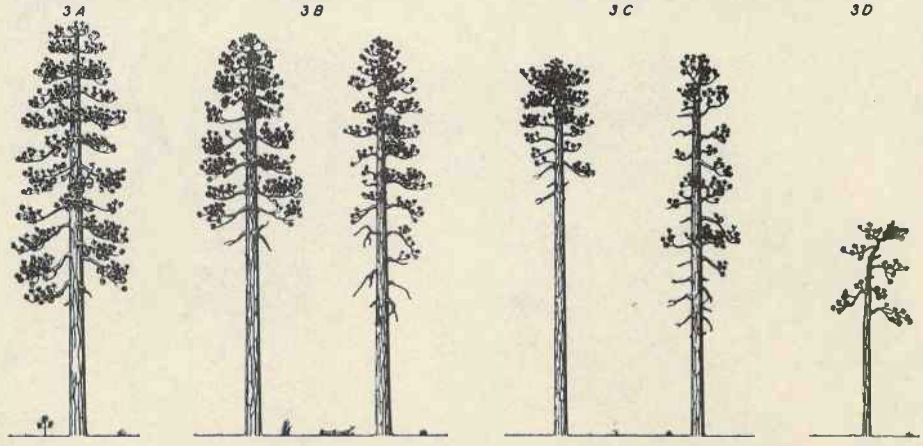
2A 2B 2C 2D

3



3A 3B 3C 3D

4



4A 4B 4C 4D

A B C D

It was found by Mr. Keen as the result of his extensive studies in the Klamath region of southern Oregon and northern California that there was a very marked variation between Ponderosa pine tree classes in the degree of susceptibility to pine barkbeetle attack. He found that, in general, the trees more susceptible to attack were the weaker, less vigorous individuals and, to a certain degree, those more advanced in age. Conversely, the thrifty full crowned trees were definitely resistant to beetle attack although, as he points out, no tree could be considered as entirely immune under severe epidemic conditions or when seriously weakened by prolonged drought. The relative susceptibility of the sixteen tree classes as determined by his studies was found to be as follows, listing the classes in order from highest to lowest risk:

Order of Susceptibility	Tree Class
Susceptible Types	
1	1D
2	2C
3	4C
4	3C
5	1C
6	3D
7	4D
8	2D
Intermediate Types	
9	4B
10	3B
11	2B
Resistant Types	
12	1B
13	4A
14	3A
15	2A
16	1A

As it is well known, the extensive Ponderosa pine forests of the Klamath Reservation have sustained very substantial damages from attacks of the pine barkbeetle and are subject to the hazard of continued heavy losses from this source. Obviously, therefore, no silviculture system which involves a partial cutting of the stand will meet the requirements of good forest

management unless it gives very careful consideration to this hazard and makes an attempt to adjust the silvicultural method to it. Such an attempt has been made in the following marking system, which seeks to apply Mr. Keen's conclusions as to the relative susceptibility of the various tree classes to beetle attack to a sound silvicultural cutting method. While by no means the final answer to this difficult management problem, and it is not suggested as such, it presents a starting basis in the effort to reconcile the elements of good silviculture, economics, and protection in the practice of sustained yield forestry on the Klamath Indian Reservation.

One of the principal difficulties in the formulation of a marking code for a given forest has been to reduce it to a set of a few simple rules applicable to any site or stand condition and at the same time sufficiently definite to be susceptible of uniform interpretation and application by different timber markers. Such a wide variety of conditions exists even in Klamath Ponderosa pine stands that it, at first, seems impossible to lay down a marking code that has the requisite features of definiteness and simplicity and is still sufficiently flexible to meet all requirements. In consequence, we find considerable variation in the treatment accorded to certain types of stands by different markers although all are presumably trying to follow the same marking rules. The difficulty has been that most timber markers find it extremely difficult to identify the many different group combinations which normally occur in a forest and are accordingly unable to treat them in accordance with the rules.

The solution to the problem apparently lies in reducing the forest to its lowest common denominator, to individual tree classes instead of group combinations. Obviously, if the individual trees can be reduced to a comparative few broad tree classes which can be readily and definitely recognized by the timber marker, and if a definite marking treatment can be prescribed for each regardless of its group associations, the marking problem will be considerably simpler and more certain of uniform results.

There does not appear to be any good reason why this cannot be done through the use of the Keen tree classification. We have found the classification to be readily learned and applied by every timber marker who has used it and that there is very little possibility of confusion through overlapping of tree classes.

We have also observed in the application of this classification to timber marking that certain tree classes are generally reserved while certain others are always marked for cutting regardless of the nature of the group associations or distribution of age classes. Apparently, only three of the total of sixteen tree classes under the Koen classification really permit of a variation in treatment depending upon site, distribution, and degree of beetle hazard. It should, therefore, be possible to evolve a workable marking code by simply prescribing the treatment which should be accorded to each tree class. This has been attempted in the following suggested marking rules.

PROPOSED MARKING RULES

Two broad general timber types are recognized based on quality of site and degree of beetle hazard. Special rules are made for marking in each type as follows:

Timber Type No. 1

Beetle hazard high as indicated by large number of beetle killed trees in the stand and presence of recently attacked or killed trees. Site quality usually poorer than average, characterized generally by open, low value, fringe type stands. Average vigor of the stand poor as indicated by the shorter average height of the mature and overmature trees.

Tree Class	Marking Treatment
1A) 1B) 1C) 1D)) 2A) 2B) 2C) 2D)	Always reserve unless infested with active beetle broods
3A)	Always reserve unless infested with active beetle broods.

3B	Cut all trees in excess of 30" D.B.H. Reserve trees below 30" D.B.H. having symmetrical sharp pointed crowns and comparatively dense, healthy foliage.
3C) 3D)	Always cut if merchantable.
4A	Cut all trees in excess of 34" D. B. H. Reserve occasional trees below 34" D. B. H., if needed to fill large openings.
4B) 4C) 4D)	Always cut if merchantable.

Timber Type No. 2

Beetle hazard comparatively low as indicated by comparatively small number of beetle killed trees in the stand and little if any evidence of recent beetle attacks (within the past two or three years). Site quality good to excellent, characterized by fairly dense stands of high average grade. General vigor of the stand very good as indicated by the density and color of the foliage and the greater than average height of the mature and overmature trees.

Tree Class	Marking Treatment
1A) 1B) 1C) 1D)) 2A) 2B) 2C) 2D)	Always reserve unless invested with active beetle broods.
3A	Always reserve unless infested with active beetle broods.

3B — Always reserve trees under 34" D.B.H., unless infested with active beetle broods. Reserve trees in excess of 34" D.B.H., if badly needed to fill large openings.

3C — Always cut if in excess of 18" D.B.H., and merchantable, except:- Thrifty, sharp pointed 3C trees may be reserved up to 22" D.B.H. It will be found sometimes that fire has killed off the lower branches of class 3B trees. A strict application of the Keen Tree Classification will throw these trees into Class 3C, but the trees are still healthy and vigorous, and are an example of 3C trees that might be reserved.

3D — Always cut if merchantable.

4A — Generally reserve unless in excess of 34" D.B.H. Reserve trees above this diameter if needed to fill large openings.

4B)
4C) — Always cut if merchantable.
4D)

It will be noted from the foregoing that only three of the sixteen tree classes are affected by the change in timber type; namely, 3B, 3C, and 4A, and that the procedure with the remaining classes remains the same regardless of the change in type. Classes 3A, 3B, and 4A will furnish most of the residual volume of the stand while classes 3C, 3D, 4B, 4C, and 4D will provide most of the cut.

The following few general rules should be added:

1. Basal fire scars unless very extensive and covering over half the circumference are not sufficient cause for marking trees which would otherwise be reserved.

2. It is usually unwise to thin groups, particularly of the larger trees, because of the serious danger of windthrow. Either the entire group should be cut or it should be reserved in areas exposed to strong winds, such as along the tops of ridges, etc.

3. Trees which are almost certain to be culls should not be marked for cutting. They have a value for ground cover and seed if left standing.

4. Trees branching into two main trunks, known popularly as "school marms", are satisfactory reserve trees if other reserve trees in classes 3A, 3B, or 4A are not available.

The application of the above marking regulations to the Ponderosa pine forests of the Klamath Indian Reservation will ordinarily result in a reserve of from 25 to 40 per cent of the volume, depending upon distribution of age classes, general thrift, etc. It is desirable from the management standpoint to leave as substantial a volume in the reserve stands as possible in anticipation of one or more subsequent cuttings before the end of the rotation period. However, sound silviculture must govern, giving special emphasis to the establishment of beetle resistant stands, and the final factor, therefore, in determining the volumes which shall be cut and reserved will lie in the composition and character of the individual stands.

Submitted by

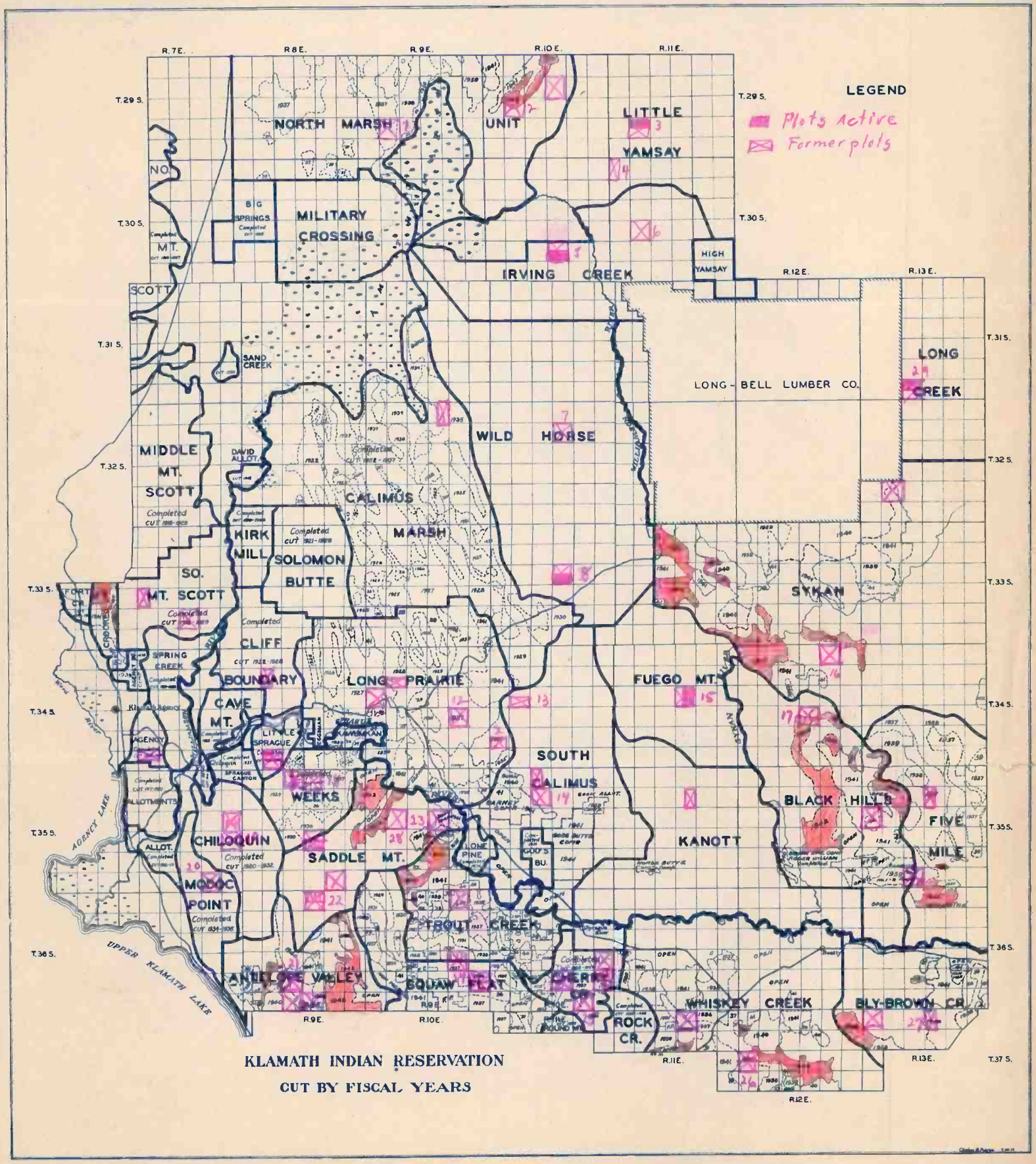
(Sgd) Carthon R. Patrie
Forester

Approved:

(Sgd) Frank B. Lenzie
Act. Regional Forester

September 20, 1937

Amended October, 1937



KLAMATH INDIAN RESERVATION

CUT BY FISCAL YEARS

MAI